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ABSTRACT

A guide on instructional program planning for outdoor education, prepared for Oakland County (Michigan) teachers, contains suggestions for program planning and lists information sources on suitable outdoor activities. The purpose of outdoor education is defined as being: "to enrich, vitalize and complement content areas of the school curriculum by means of firsthand observation and direct experience outside the classroom." Developing instructional programs is discussed in terms of roles of teachers, resource persons, and students. Components of a planned program are set forth: title, overview, objectives, materials, outline for presentation, evaluation, and bibliography. Activities for seasonal programs and any-time activities are listed. Evening programs for resident camp programs and suggested evening activities are covered briefly, as are planning for bad weather and elective activities. Three how-to sources are listed. Seven sample activities are described in detail, with sections for each on overview, objectives, materials, pre-camp and at-camp activities, and bibliography; sample data sheets are provided where necessary. Activities given study 10 common plants and their use; 10 common trees and their medical use; fallen log studies; senses in the out-of-doors; animals of the meadow; organic matter + sand + rocks + living organisms = soil; and design in nature. (MH)

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INSTRUCTIONAL PROGRAM PLANNING FOR OUTDOOR EDUCATION

1980

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INTRODUCTION

The series of guides which have been developed to assist teachers and supervisors of outdoor education in preparing educationally meaningful experiences for children. This guide will have suggestions for program planning and lists sources for more detailed information on suitable outdoor activities.

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Prepared for use by Oakland County teachers by Oakland Schools.

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What is Outdoor Education

Donald R. Hammerman in his book Teaching in the Outdoors appropriately states that the purpose of outdoor education is to "enrich, vitalize, and compliment content areas of the school curriculum by means of firsthand observation and direct experience outside the classroom." Classroom instruction often deals with abstract ideas and non-real world experiences. Outdoor education allows students who, in today's world are often limited in their opportunities to interact with the natural world, a chance to do so in meaningful ways.

Outdoor education differs from summer camp or day camp in that it consists of school directed activities carried on outside of the school building in a resident center, school site, or other suitable location for the purpose of providing students with sound educational experiences. It should be an extension of the "indoor" curriculum and as such contribute to the child's total educational experience. Outdoor education includes all areas of the curriculum including such areas as: art, language arts, math, physical education, social studies, music and science. Each using the key ingredient of direct experiences in the out-of-doors to develop concepts for children.

Developing Instructional Programs

Hammerman describes a good outdoor education program as "a program that involves pupils, teachers, and outdoor education resource people planning and working together to develop an optimum teaching-learning climate." It is important to emphasize that outdoor education experiences should be planned experiences. Without planning many educational opportunities may be overlooked. This does not mean that "teachable moments" (unplanned events) are not utilized when they occur as they are important too. However, the teacher who has a well planned program in operation will often see those "teachable moments" when they occur rather then frantically looking for something to keep the kids occupied.

The classroom teacher's role in planning and conducting outdoor educational experiences is critical. They know the students and the expected behavior patterns as well as their educational needs. They can with adequate preparation undoubtedly do the best job in providing their students with meaningful outdoor experiences. Resource persons may have a more extensive background in a particular area but they often are not trained nor skilled in working with students. Resource persons are most effective when they have been involved in planning the experiences with the students and teachers and are familiar with the educational objectives the teacher has.

The student's role in outdoor education is often overlooked in program planning resulting in misconceptions by students as to the role and responsibilities they will have during an outdoor education experience. In preparing students for taking part in a resident program the mistake often made by teachers is an over emphasis on the fun that students are going to have when they "go to camp." This results in the students looking at outdoor classes as infringements upon their "fun" time causing both the students and teachers to leave camp with less than satisfactory results. We have found that when students are prepared for outdoor "school" with classes and student responsibilities for these classes spelled out the students find their outdoor experiences worthwhile and fun too!

Components of a Planned Program

In planning an outdoor education program there are certain components which should be considered in order to maximize the educational benefits of your activities. Good programs seldom just happen they take a great deal of thought and planning on the part of teachers, students, resource persons, and administrators.

The initial step involves the selection of those concepts and skills that the staff would like to develop with students. In doing so consideration should be made regarding inclusion of various content areas and what contributions each can make toward attainment of concepts and skills identified. Designing the series of activities should then follow with these suggested components to be considered.

Title: (a short descriptive title which describes the theme of the activities is helpful)

Overview: (one short paragraph describing what the students will be doing during the course of the suggested activities)

Objectives: (what cognitive, psycomotor, and attitude objectives do we have in mind for the students)

Materials: (what equipment, handouts, A-V materials are needed to conduct the activities with students. It is helpful to suggest the number of items you would need for a certain number of students)

Outline for Presentation:

a. Preparation (a description of the kinds of pre-camp activities for students. These activities may involve in class or school site work for the students)
b. At Camp (a description of those activities which can best be done at the outdoor study site. Activities that can be done just as well at the school site should be done there either as preparation or follow up)
c. Follow up (the kinds of activities which can provide the students with additional learning experiences upon their return to school)

Evaluation: (how can the teacher and learners determine if they have gained anything. This may or may not include pencil and paper tests. Often it will be the students demonstrating the skills acquired through application, a higher level operation

Bibliography: A-V (list of films, filmstrips, etc. which may be used. It helps to annotate the listings for future use by the teachers and others with whom the ideas are shared. We do share in outdoor education)

Books (list of books, annotated, which may be used by the teacher in preparation of the students to develop or extend the concepts being stressed in the activities)

Activities to Build a Program Around for the Seasons:

Fall

1. Wild Edibles
2. Plant Dyes and Their Use
3. Collecting Seeds/Dispersal Methods
4. Soil Studies
5. Art with Weeds and Things
6. Forest Litter Study
7. Survival
8. Archaeology

Winter

1. Birds of Prey: Owls, Pellet Analysis and Hoot-Ins
2. Winter Weeds
3. Animal Tracks in the Snow
4. Snow and Ice Studies
5. Snow Shelters and Winter Transportation
6. Galls/Winter Twigs/Lichens
7. Ice Fishing and Pond Study
8. Winter Animal Homes/Feeder Studies

Spring

1. Spring Flowers
2. Weather Studies
3. Maple Sugaring
4. Buds
5. Introduction to Backpacking
6. Sketching and Photographic Studies of Signs of Spring
7. Outdoor Cooking
8. Night Reptiles and Ambhibians/Observing Calling and Territoriality Behavior

Goodies Any Time

1. Cemetery Studies
2. Creative Writing Sessions
   a. Animal Ads/Bulletins
   b. Developing a Trail Guide
   c. Historical Events through Students Eyes, i.e., Pioneer Life
3. Map and Compass Work/Orienteering
4. Dendrochronology-the Study of Tree Ring Stories
5. Math Measurements and Problems for the Out-of-Doors
6. Song Night/Folk Songs and Camping Songs
7. Pond and Lake Studies
8. Tree Studies
9. Fallen Log Microcommunity Study

Considering Evening Programs

Here are some ideas for evening activities for resident camp programs. One word of caution-it pays to end the day with some quieting activity either as part of the evening session or after it and prior to the students going to bed.

Suggested Evening Activities

1. Antiques and Artifacts (Kids look at and try to guess what some unusual antiques were used for/discussion and demonstrations on their use can be fun too.)
2. Hoot-In and Night Animals (Using taped calls of owls the group attempts to bring one in close. Using flourscent powder in baited food and a black light the class can see signs of night animal activity).
3. Night Hikes (With only the leader carrying a flashlight the group has an opportunity to experience the night).
4. Skits and Drama (The more corny the skits the funnier they are).
5. Astronomy (Need a clear night to use a telescope but with some advanced preparation it can be great).
6. Candlelight Ceremonies (Good opportunity to do some valuing with the group).
7. Campfire Sing Along.
8. Fun Night or Mini Olympics (Simple fun relays, contests, etc.).
9. Stories and Myths (Watch out for too many ghost stories).

Plan for Inclimate Weather

In resident programs the general rule is that the activities planned go as planned unless the weather is severe. In the case of rain or extreme cold the amount of time outside may be reduced to avoid prolonged exposure.

One or two days of alternative activities should be planned in case the weather conditions are extreme.

Elective Activities

If the students are involved in the program planning and have had pre-camp experiences their interest in the camp activities is much higher. We have found that even with a high interest rate in the activities students like an opportunity to select an activity of their own for at least part of the camp day. By pooling staff skills and interests a variety of short special interest sessions may be offered for them to choose from.

A good time offering special elective sessions is after the afternoon classes and prior to dinner.

Some How To Sources:

Swan, Malcolm D., Tips and Tricks In Outdoor Education, Danville, Illinois: The Interstate Printers and Publishers, Inc., 1970. One of the best.

....., Environmental Discovery Units, Washington, D.C.: The National Wildlife Federation Education Service, 1972. A series of individual units which include the How To and even the data sheets.

....., Examining Your Environment Series, Toronto: Holt, Rinehart and Winston of Canada, 1974. An excellent series for use in outdoor education. Distributed in the U.S. by Winston Press, 25 Groveland Terrace, Minneapolis, Minnesota 55403.

TITLE: Ten Common Plants and Their Use

Overview: Plants, as we learned from the Native Americans and early settlers, have many uses. Some were edible, some medical, some for dying. This history can be used to relate plants to modern medicine and food sources.

Objectives:

1. Identify 10 common plants.
2. Taste the edible plants.
3. Learn their historic uses and relate them to modern times.

Materials:

Collecting bag (don't over pick)
Knife or cutting instrument

WARNING: Some plants are poisonous. Be sure of your identification. Do not sample anything when there is doubt. Example: Mushrooms have little caloric or nutritional value and because of the extreme danger in some varieties they should be avoided.

Pre-Camp:

1. Discuss these things:
   a. Picking kills so practice conservation. Be discriminate.
   b. Learn the protected plants so they never get collected.
   c. Only plants that grow in abundance should be collected.
   d. Choose plants to study that are available during the season you are going to camp.

At Camp:

1. On a hike look for the following plants, collecting those that are edible.
   a. Skunk Cabbage-young plants can be eaten by boiling, dumping the water and reboiling about three times. Winnebago tribe used the rootstock for nervous disorders and dropsy.
   b. Yarrow-was used by Zuni Indians for treating burns and wounds. They ground the entire plant, steeped it in cold water and used the liquid for cooling the burn. The Winnebagos steeped the whole plant and poured the liquid in the ear for earache.
   c. Wintergreen-grows in cool, damp forests. Its bright red berries are edible, being the principle food of partridges, grouse and deer in the late fall. Leaves can be steeped for tea. Oil extracted was rubbed on body as a folk remedy for aches and pains. A piece of cloth was soaked in liquid and then tied to sore joints.
   d. Queen Anne's Lace-has been used by most everybody for almost everything. The Mohegans used the blossoms in a tea for diabetes. The French used the seed in making liqueurs and the oil for perfume. In bad times many people roasted the root to use as a coffee substitute. An excess intake can turn your skin yellow.
   e. Dandelion-most often used for salads, wine and dried roots as a coffee substitute. A tea of roots was used by early settlers for heartburn and a tea made with the leaves was for a tonic.
   f. Scouring Rush (Horsetail)-the heads of the reproductive shoots were eaten raw for diarrhea. The stalks were boiled and the liquid used as a hair wash. It eliminated fleas and lice.

g. Wild Bergamot-Indians used the oil collected by boiling the leaves to dry up pimples. The Ojibway extracted the oil which they inhaled to relieve bronchitis. Other tribes used it for a hair pomade and others boiled leaves to eat with meat.

h. Catnip-tea used by Mohegans to cure infantile colic. The plant was also thought to have sedative effects.

i. Milkweed-the milky substance was rubbed, by the Catawba Indians, directly on warts. No mention is made anywhere if this remedy worked or not.

j. Puffballs-the Blackfoot tribe used the powdery center, applied to wounds to stop bleeding.

Evaluation: The only evaluation needed would be pupil participation and interest on the trail. Students should also be able to identify ten common plants.

Bibliography:

Densmore, F., 1974. How Indians Use Wild Plants for Food, Medicine & Crafts. New York: Dover.

Weiner, M.A., 1972. Earth Medicine-Earth Foods. New York: Macmillan.

TITLE: Ten Common Trees and Their Medical Uses

Overview: The history of Native American and early settlers' use of trees for medical purposes will lead to some interesting facts and background on the use of trees for modern medicine.

Objectives:

1. Identify ten common trees.
2. Prepare some of the teas or tonics described.
3. Learn how the Native Americans used these trees and how modern man still uses this knowledge in today's society.

Materials: Tree Finder
Collecting bag
Knife or cutting instrument

Pre-Camp:

1. Discuss the common trees of the area.
2. Make a leaf collection.
3. Discuss the cautions in collecting any edibles: a) eating/drinking too much of any substance; b) careful identification for safety; c) remember skinning the bark from the trees will kill them so some things may be discussed and not eaten/drunk.

Michigan White Pine

At Camp:

1. Tree hike.
2. Collect, identify, discuss while on the trail.
3. Bring back useful specimens.
4. Listed below are ten common trees of our area and some facts about each.
   a. Weeping Willow--usually found near water. Chew a small twig for cure of headache. Do not swallow-just chew. Contains many properties of aspirin. Isn't the most pleasant tasting.

b. White Pine--the inner bark is used today as an ingredient in a commercial cough syrup. The bark was used by Indians as a tea for colds and coughs and the resin on sores and wounds.
c. Aspen--Crees used inner bark for food. Boiled bark for tea and used for coughs. Chew on bark for headaches. Old time doctors used bark as a tonic for fevers and to promote sweating.
d. Red Cedar--oil from berries was used for dysentery. Some Indian tribes extracted the juice of the berries by chewing and held the liquid in their mouths as an antiseptic rinse. Also used as: scent in soap, needles burned as insense, as a moth repellent.
e. White Oak--Iroquois boiled the bark and drank liquid for diarrhea. Oak was an important food for many tribes. After the acorns were leached they were used for making flour.
f. Sassafras--most Indian tribes used this plant for one ailment or another. Used as a tonic for: high blood pressure, promoting perspiration in colds, lowering fevers, and promoting eruption of rash in measles. Still used today as an antiseptic agent in dentistry, ingredient in root beer, chewing gum, toothpaste and mouthwash.
g. White Cedar--tribes used tea to relieve headache, heart pain and to reduce swelling and to relieve rheumatism. However, it had to be used carefully because in high doses it can cause convulsions. Indians also used it to make bows, baskets, canoes, and roofing.
h. Balsam Fir--is used for cuts, wounds and burns.
i. White Ash--an old tale says that the plant is so offensive to rattlesnakes that the snake is never found on land where it grows. Many hunters used to stuff the leaves in their boots as a snakebite preventative. The bark was also boiled and the tea used for a remedy against snakebite poison.
j. Staghorn Sumac--tea used as a gargle for sore throats.

Weeping Willow

Evaluation: Only evaluation needed would be evaluation by performance, in that; the children learn to identify the trees in the field.

Bibliography: Angier, B. 1966. Free for the Eating, Harrisburg, Pa: Stackpole Books.
Densmore, F. 1974. How Indians Use Wild Plants for Food, Medicine and Crafts. New York: Dover.
Stone, E. 1962. Medicine Among the American Indians. New York: Hafner.
Weiner, M.A. 1972. Earth Medicine-Earth Foods. New Yrok: Macmillan.

Quaking Aspen

TITLE: Fallen Log Studies

Overview: The fallen log community is a small restricted micro-community existing in a larger major ecological community (forest). The students will find and examine plants and animals encountered in or near a fallen log. The living things they might encounter include: algae, mosses, mushrooms, beetles, snails, ants, termites and centipedes. The students will also see how the fallen log interacts with the total forest community as a source of food, source of humus, hibernation spot, feeding station, etc.

Objectives: The students will experience first hand the interrelationships that exist between plants and animals by locating and systematically examining a fallen log community.
The students will collect for further examination a variety of interesting forms of plant and animal life.
The students will respond to specific questions about ecological succession by:
a. Completing question-answer sheet.
b. Guided discussion of the fallen log examination.

Materials: One pick axe
Nail
Hand lens
Ample specimen (baby food)jars
Insect and plant guides
Paper to record findings

Presentation:

a. Preparation: In a class discussion get the student's ideas about why trees fall down; what happens after the fall; what might be found around the fallen tree. Introduce a vocabulary list including words from the following list:
   Micro-community
   Micro-organism
   Decay
   Anthropods
   Centipede
   Mollusk
   Nocturnal
   Decomposition
   If available, have class view filmstrip "Life in a Fallen Log Micro-Community" (see bibliography)

b. At Camp: General procedures should parallel routine set up for a nature trail. Specific instructions should be given for the equipment...particularly the dangerous pick axe. To locate a fallen log, some departure from established trails is to be expected. Several students could scout limited areas ahead of the main group. Students may be assigned specific tasks such as: scouts, log dissectors, specimen collectors, recorders, etc. Upon locating a fallen log, students should not proceed to open it. External evidence and specimens should be first observed and recorded. Mosses, algae, ferns, scat, etc., should first be gathered and discussed. If the bark is still intact, carefully lift and note pupae, larvae, insects, bugs, seeds, etc. Insects may be found in any stage of their life cycles. Use the nail to test the softness of the rotting wood and as a dissecting tool. The pick axe should be used only if the log can't be pulled apart with the hands. Care to not destroy more natural surroundings than necessary should be taken. Warning! If a salamander is found, the study will tend to turn into a giant "salamander hunt!"

c. Follow-Up: The children may search the school grounds for possible habitats for micro-communities.

Evaluation: Have students discuss the activity using vocabulary terms correctly. Use the Fallen Log Data Sheet provided to encourage student response. Later in the year, find a similar locale near your school. Ask the same questions. Compare results.

Bibliography: Sound-filmstrip Life In a Fallen Log Micro-Community SVE A469-8 (Includes discussion guide)
Zim Science Booklets (Golden Press) Insects, Plants, Non-Flowering Plants.
Cornell Science Leaflets, Decay-Food Chains-Animal Traces.
Sound-filmstrip Life in a Log, Centron Educational Films, Lawrence, Kansas.

Fallen Log Data Sheet

Evaluation:

1. Type of log--(standing, newly fallen, partially decomposed, stump). Circle.
2. Location of the log--
3. Is the bark still on the tree?--
4. Is the bark easily removed or not?--
5. Can a nail be pushed into the wood?--
6. Estimate how long it has been dead.--
7. Is the wood moist or dry in this specimen?--
8. Is there moss present on the tree?--
9. Is there lichen present on the tree?--
10. Is there fungus present?--

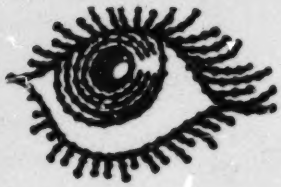
    Draw a picture of the fungus type
11. Are borings apparent in the wood or on the surface?--
12. Are there any vertebrates living in or on the tree?--

    If so what are they?--
13. Are there any mammal runways nearby?--
14. Are there any mammal droppings (scats) nearby?--
15. List all the animals you can see on or in the tree filling in this chart.

Animal Name/Picture	Animal Name/Picture	Animal Name/Picture

16. What is happening to the wood in the tree?--

    Rub some of it between your hands.
17. Which part decomposes first and last? Why?--
18. How do animals help in decomposing the log?--



TITLE: Senses in the Out-of-Doors

Overview: Many senses are overlooked in our eagerness to identify everything by sight. Children should develop their skill in using other senses as they do a variety of activities in the out-of-doors.

Objectives:

1. To develop all their senses in the out-of-doors.
2. To describe each sense as they experience it.
3. To develop some skill in using their various senses to classify environmental objects.
4. To develop an awareness of the beauty of nature when children put all their senses to use.

Pre-Camp:

1. Walk the playground. Let each student bring back objects such as soil, grass, rocks, litter, etc.
2. Let them use their senses on these objects.
3. Bring things into the classroom to expand the basic things they've found on the playground.
4. Pick some object and do a creative writing lesson on it using the senses to describe it.

At Camp:

1. Have a senses hike.
2. Observe:
   a. Sounds-what kinds of sound? Soft, scratchy, wind, etc.
   b. Color-how many kinds of green? other colors?
   c. Shape-small, round, tall, square.
   d. Texture-rough, smooth, hard, soft, wet.
   e. Taste-
      sour (grapes, sweet and sour grass)
      sweet (violet flower)
      spicy (mint, spice bush)
      peppery (peppergrass, spring cress)
      cattail (ask children how they would classify this)
   f. Smell
      fragrant (flowers)
      unpleasant (skunk cabbage)
      aromatic (pines)
      earthy (soil and decaying wood)

Evaluation:

1. Put these senses to use in all the camp classes.
2. Discuss what was seen, felt, etc.
   Write your feelings in regard to any of the senses.
3. Do students continue to use senses throughout the year?

Additional Activities:

1. Trust walk-partners. Blindfold one, lead partner to different places to use senses.
2. How does a centipede feel walking on the ground? Get down on eye level with a centipede. Later describe experience.
3. Lie down quietly in pine woods, listen relay. Describe how camper would feel if they were a tiny pine trying to grow in that environment.
4. Using rough grade sandpaper have campers collect (loose objects on ground) and rub them on sandpaper to draw a picture. They will be quite a vareity of color.

Bibliography:

VanMatre, Steve, Acclimatization, Martinsville, Indiana, American Camping Association, 1972.

Touch in the Outdoor Environment, Chicago, Illinois: P.A. Schiller and Associates.

TITLE: Animals of the Meadow

Overview: This is a study into the ecological relationships found in a grassy meadowland. The pupils will be involved in collecting data concerning the plants, animals, soil conditions and climatic factors of a selected area (5 sq. meters). Activities include collecting, measuring and classifying plants and animals.

Objective: To study the types, characteristics and locations of animal life within a 5 sq. meters area of grassland.

Materials: Trowel
Hand magnifier
27.5 cm ruler
Plastic vials
Clipboard
Pencils
Insect nets

Directions:

1. Remember that an animal is any living thing which is: (a) able to move; (b) reproduces by eggs or live birth (usually); breathes oxygen from air or water; (c) eats food rather than produces it.
2. Using the 5 sq. meters area which has been set out and trying to avoid interfering with other groups, examine the entire area for signs of animal life.

Large Animals

1. Note any large animal seen (mammal, bird, reptile, amphibian). Record its color, size (approximate), number of each type of animal.
2. Look for signs of animal activity such as animal runways, food cuttings, gnawings, clawmarks, footprints, nests, tunnels, holes, animal droppings.

Small Animals

1. Note smaller animals (insects--moths, butterflies, ants, spiders, snails, worms, etc.) seen. Be sure to look over the entire area. Some may be found by removing the top 7 to 10 cm of soil with the trowel and carefully sifting through it. Look under rocks, logs, but be sure to put these objects back exactly the way you found them.
   Using the insect nets sweep across the plants and try to catch some of the insects which might be found there.
   Try to catch some of the small insects which might be on the ground.
2. Sketch each animal type seen. Note the color, number of body parts, number of legs, evidence of wings and the location within the area where the animal was found.
3. Use tha Animal Study Data Sheet to record information collected.

Bibliography:

Insects, Zim, Golden Press.
Mammals, Zim, Golden Press.
Butterflies and Moths, Zim, Golden Press.

ANIMAL STUDY DATA SHEET

Grassland

Animal Found	Location Where Found	No. of Animals Seen	Length	Color	No. of Body Parts	No. of Legs	Wings	Evidence of Animals	Location of Animal Signs	Sketch of Animal Sign	What animal do you think made this sign?
Bee	In the air	2	1.3 cm	Yellow Black	3	6	4	drop-pings	grass	.8 long	rabbit

Post Camp:

TITLE: Organic Matter + Sand + Rocks + Living Organisms = Soil

Overview: This field experience can show students that the soil-water relationship is essential for plant-animal life.

Objectives:

1. To compare soil samples for composition, texture, potential plant growth and water retention.
2. To relate the amount of water retention with types of life (animal and plant) around the area.
3. To recognize that soil, water, wildlife, vegetation and man are interdependent.

Pre-Camp Activities:

1. Discuss soil composition.
2. Methods of taking soil profiles.
3. How to read the results of litmus paper. Red litmus turns blue if tested material is neutral or alkaline--blue turns pink if exposed to acidic material. What does it mean to have these types of soil?

Equipment to be taken to Camp:

1. Pie plate for each soil sample.
2. Baby food jars.
3. Digging tools (trowel, shovel or spoon).
4. Water (distilled).
5. One half pint milk cartons
6. #10 can with top and bottom removed
7. Blue and red litmus paper
8. 3 plastic sheets or newspaper

Camp Activity:

1. Collect soil samples from marsh, forest and open field.
2. Check samples with litmus paper. Make records.
3. Discuss, by using litmus test and observation what types of plants and animals survive in or near each type of soil. Names of plants aren't important just differences of each.
4. Porosity test: How much water does each soil hold.
   a. Push bottomless/topless can 2.5 cm into the soil. Pour one baby food jar of water into can and record how long (in seconds) it takes to disappear.
   b. Test these soils in addition to those already mentioned: roadway, lawn, fence row, and cultivated field.
5. Empty some dry samples onto newspaper. Look for these things:
   a. color.
   b. smell.
   c. Does it sift through the fingers?
   d. weight (by guess).
   e. feel--wet? dry? sticky?
6. Place sample of each soil in cut off milk carton. Add jar of water. What happens? Does it dissolve or become pasty? Let it sit and examine later.
7. Dig through remaining dry samples. Are there any living things? twigs? stones? seeds? etc.?
8. Dig down for a soil profile. Can students see the differences in strata? What is growing, living in each strata?

Post Camp:

1. Find places to try some tests in the school yard.
2. Place a sample of the soils in flowerpots and water. Observe any sprouting weed seeds.
3. Using a glass gallon jug--fill jar 2/3 full of water. Pour in soil until jar is half full. Agitate the jar. Let the soil stand until the soil settles. Put paper behind the jar and mark off the letter of the settled soil.

Evaluation:

1. Discuss the interdependence of soil, water, vegetation, wildlife and man.
2. Post data sheet using it to make comparisons with samples taken from the playground.

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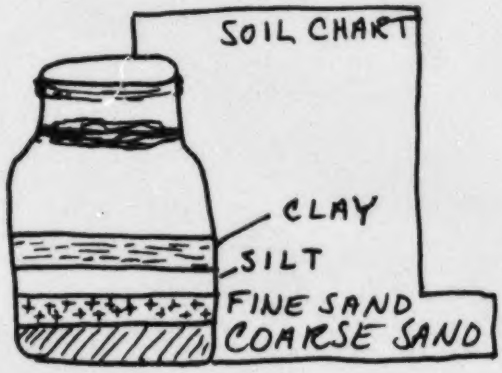


SOIL DATA SHEET

1. Sample #_____.
2. Where collected _____
3. Color _____
4. Time for water run-off _____ seconds.
5. Results of litmus test. Circle one.

   alkaline/neutral acidic
6. Feel?
7. Does it sift? _____
8. Smell? Describe if yes _____
9. What plants did you find in sample? _____

   _____.
10. What insects live in this soil? _____

    _____.
11. Other things found in soil sample _____

    _____.
12. What kinds of animals would you expect to be living in this environment?

    _____

    _____.
13. What uses could man find for this type of soil? _____

    _____.

TITLE: Design in Nature

Overview: The students, while working with a variety of objects and tools, will identify designs and patterns of symmetry in nature. They will accord these patterns and expand upon them through focus sessions in the out-of-doors. Upon return to their classrooms they will be provided with additional experiences and be introduced to additional design concepts such as radial vs. bilateral symmetry.

Objectives: Children will find many new ideas for artistic pattern and design as they discover the variety of shapes and forms in nature. The awareness that there are a variety of shapes is also the beginning of being able to identify trees, rock structure, stream action, etc... Discover that a square is extremely difficult to find in nature.

Materials and Equipment:

1. Paper, pencils, lapboards, crayons
2. Hand lenses
3. Microscopes

Outline for Presentation:

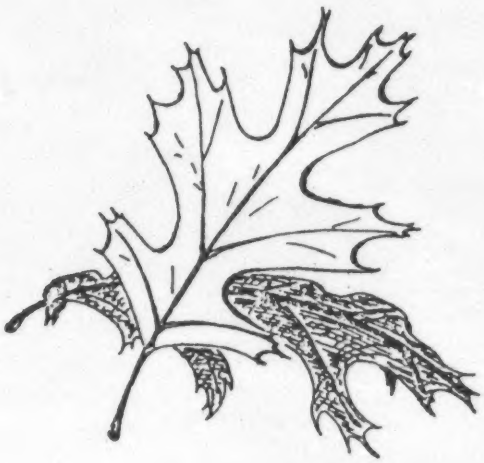
A. Preparation
   1. Discuss concepts of design, pattern symmentry, arrangement, of parts, etc.
   2. Recall designs which have in the past been particularly pleasing, interesting, functional for one reason or another.
   3. Identify some geometric characteristics of several natural objects. Suggested: a starfish, a snail shell, a branch cross-section, etc. Sketch.
   4. Set up a vocabulary which has promise of being useful in identifying and describing design in nature.
   5. Plan a trip of observation, photography, and collecting relative to enhancing our knowledge and appreciation of design in the out-of-doors.

B. At Camp
   1. Take a hike during which designs in the surroundings are noted and discussed. Notes are made. Samples of certain materials may be collected: branching stems, leaves, shells, rocks, etc...
   2. Photographs are taken of physiographic features, trees, streams, various types of vegetation, etc.
   3. Interesting animals may be sought out and collected: crayfish, earthworms, snails, turtles, salamanders, insects, etc.
   4. Lapboards, paper, charcoal, paste, crayons and pencils are taken to "the field" for recording free-hand design in the surroundings: trees of the swamp, the pine grove, a brush pile, the meandering stream and lake, windblown sedge and grasses of the river margin, tree silhouettes, etc. One type of object or a view may be sketched.
   5. Back in the lab, hand lenses and microscopes may be useful to find "hidden design" or bring to better view some aspect of the structure: ommitidia of crayfish eye, feathery structure of crayfish gill, etc.

C. Follow-Up

1. Schematic sketching to emphasize certain features of the design in nature which proved interesting: whorl of pine branches or horsetail leaves, dendrite pattern of fibrous root system, concentric rings of growth of a log section, branching stems of a hardwood tree such as the beech, mussel shell with umbo and rings of growth, spire of a snail shell, pavement jig-saw arrangement of epidermal cells of a broad leaf, etc.
2. In more precise terms, describe the design of an animal such as the frog, earthworm, crayfish, or salamander: bilaterally symmetrical, linear series, radially symmetrical, center of gravity, balance, concentric rings, stratified, etc. Relate all terms to roots of the terms and objects described.

Evaluation: Write a composition on "functional design, beauty of design, angular design in nature", etc.



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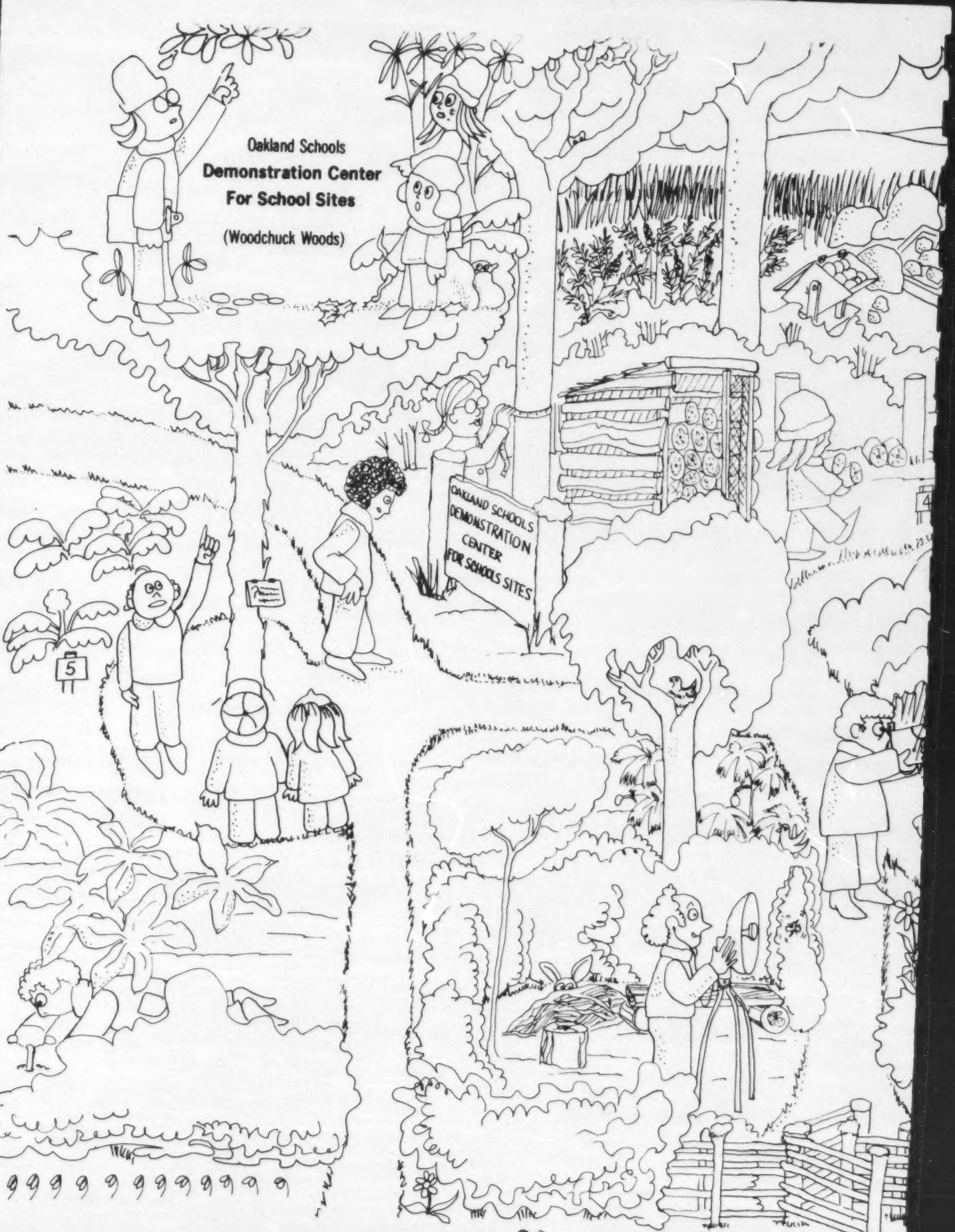
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